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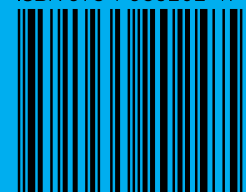
Beyond Shelter presents 25 reports from the field written by a wide array of experts who are on the frontlines of disaster prevention and recovery around the world. Together, these stories illustrate the reality that evolving risk requires new ways of thinking, and that architects have a leading role to play.

"Why are we so unprepared after every disaster? Our reaction is more surprise than readiness. Bad construction can worsen the crisis. Survivors and well-meaning volunteers need experts to guide them toward safe, long-term, locally appropriate solutions. In the future we must do much, much more with much, much less. The lessons in this book move us well toward that important goal."
— **Bryan Bell, founder, Design Corps, and editor, Expanding Architecture: Design as Activism**

"A safe, durable, and dignified home is an aspiration of all, yet often hindered by a lack of access to the required know-how. This valuable work champions the need to involve the built-environment professionals and practitioners who have such expertise on the frontlines of post-disaster and sustainable shelter and settlement."
— **Graham Saunders, head, Shelter and Settlements Department, International Federation of Red Cross and Red Crescent Societies**

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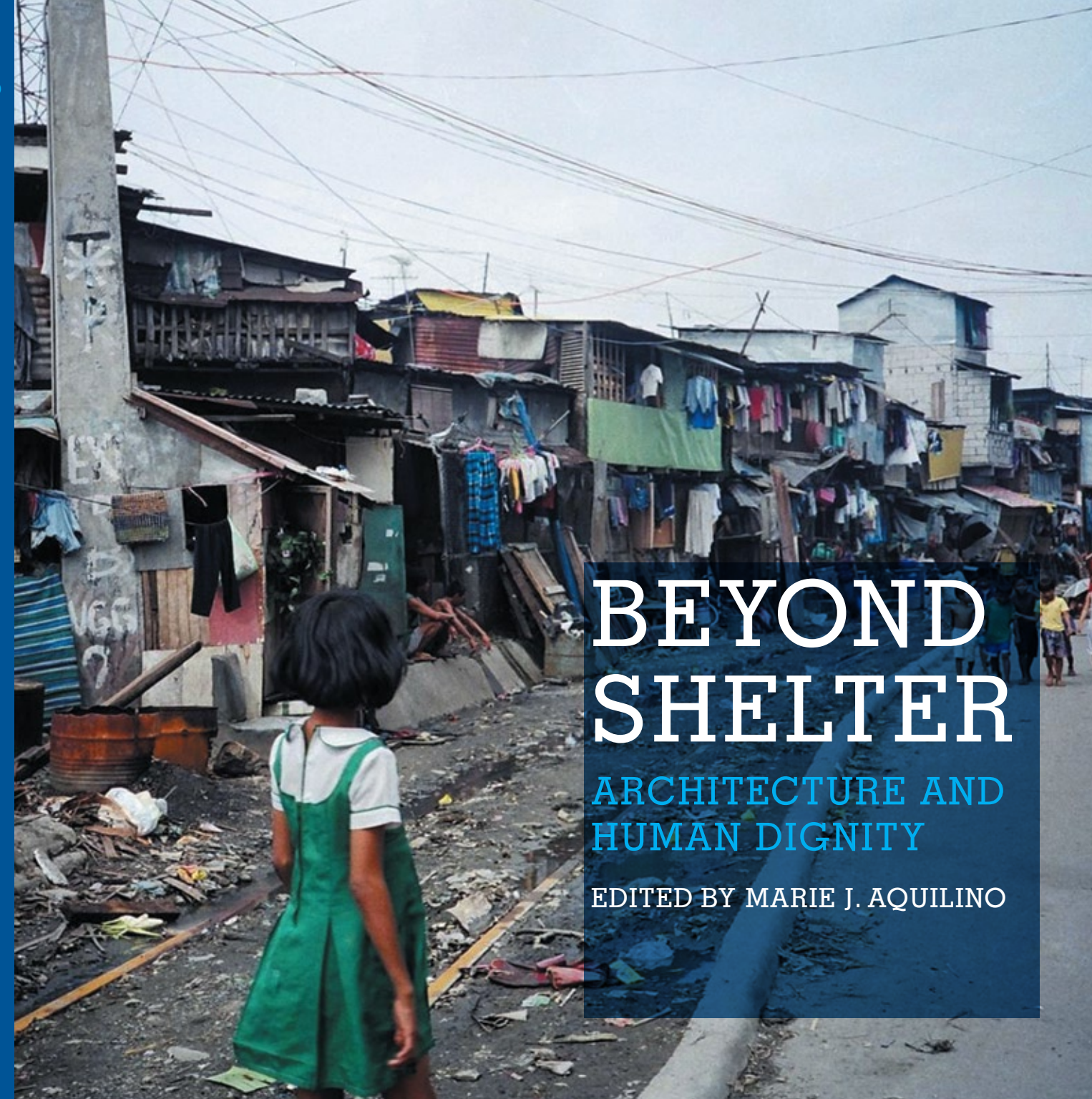


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AQUILINO

BEYOND SHELTER
ARCHITECTURE AND HUMAN DIGNITY

METROPOLIS
BOOKS



BEYOND SHELTER

ARCHITECTURE AND HUMAN DIGNITY

EDITED BY MARIE J. AQUILINO

Around the globe, groundbreaking work is being done by small teams of outstanding professionals who are helping people recover from disaster and rebuild homes, infrastructure, and communities, bridging the gap that separates short-term emergency needs from long-term sustainable recovery. But this level of expertise remains concentrated in the hands of far too few experts working worldwide.

Urgent questions about the architect's role in disaster prevention and recovery have arisen since 2004, when the Indian Ocean tsunami killed more than 200,000 people. In the last decade natural disasters and hazards have affected 200 million people, 98 percent of them in the developing world, where billions of dollars in aid are absorbed annually by climatic and geologic crises. Those in the developed world are not immune, as extreme temperatures and increased flooding and droughts are expected to expose vast numbers of people to the status of eco-refugee.

Beyond Shelter presents 25 generously illustrated reports from the field by the leaders of many of the world's most provocative architecture and engineering firms and most accomplished non-profits, research centers, and international agencies. Robin Cross, Teddy Cruz, Sandra d'Urzo, Deborah Gans, Victoria L. Harris, John Norton, Sergio Palleroni, Raul Pantaleo, and others provide up-to-the-moment accounts of disaster prevention and sustainable recovery efforts in a wide range of urban and rural locales, including Manila, New Orleans, Gujarat, São Paulo, Sudan, Vietnam, Kashmir, Sierra Leone, Kansas, and Haiti.

As Patrick Coulombel, the founder of Architectes de l'Urgence, states: "Today, we architects must recognize our obligations and organize our strengths and talents to respond to the constant, urgent crises that confront people displaced by environmental hazards and conflict. This is the challenge facing architects worldwide in the twenty-first century."

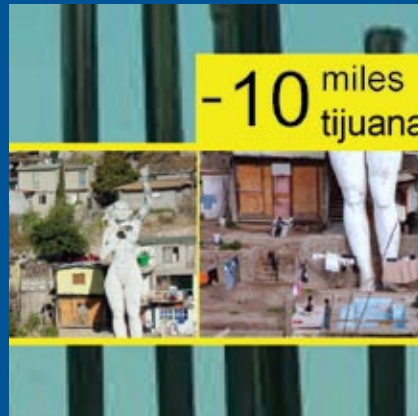
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METROPOLIS BOOKS



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PREFACE

BEYOND SHELTER: ARCHITECTURE AND HUMAN DIGNITY

MARIE J. AQUILINO
ÉCOLE SPÉCIALE
D'ARCHITECTURE, PARIS

Two hundred million people (that's two-thirds of the population of the United States) have been affected by natural disasters and hazards in the last decade. For every person who dies, some 3,000 are left facing terrible risks. Ninety-eight percent of these victims are in the developing world, where billions of dollars in aid are absorbed annually by climatic and geologic crises. Now we are learning that extreme temperatures, intense heat waves, increased flooding, and droughts due to climate change are expected to expose vast numbers of people to the status of eco-refugee, a condition that poses a real threat to human security as people are forced to migrate. Twenty million people are currently on the move in Pakistan, where torrents of mud and water have forced them from their homes. Experts are also finding that as these natural hazards increase annually in frequency and severity, the ability to protect communities once thought safe will diminish, leading to ever-greater loss of life.

In 2008 over 100,000 people died in the Chinese province of Sichuan when buildings collapsed during an earthquake. Among them, 19,000 school children were buried in rubble when unsafe school buildings failed. Suddenly questions were raised about the role of architects. Looking to assign blame, officials turned on architects to account for what had happened, and in almost the same breath turned to architects and engineers from around the world for solutions that would calm outraged families. A few months later in Myanmar a storm surge in the low-lying, densely populated Irrawaddy River delta called Nargis left an estimated 140,000 people dead. In Haiti on January 12, 2010, an earthquake shook poor-quality materials and construction into twenty million cubic yards of boulders and dust, interring at least 220,570 people and leaving a million and a half homeless. The number of children who perished has not been published, though half the population of Port-au-Prince was underage. Yet in an even more powerful earthquake in

Chile that same year about 500 people died. The Haiti earthquake, though severe, was not the only cause of so high a toll: the other culprit was unsafe buildings.

Urgent questions about the role and responsibility of architects have been circulating since the Indian Ocean tsunami killed more than 200,000 people in 2004. At that time the relief effort exposed troubling gaps between humanitarian aid that targets the short term and our ability to rebuild homes, infrastructure, and communities well. While aid agencies are willing, they do not have an architect's knowledge or insights; consequently, the buildings that replace destroyed communities are frequently unsafe.

Unfortunately, this is as true today as it was seven years ago. However corrupt or appalling the politics (and policies) behind the catastrophes in Sichuan and Haiti, professional architects—whether in the developing or developed world—are notably absent from efforts to protect people from disaster. Yet architects have recently been very active in other areas of public interest—for example, they have instigated a range of creative strategies to improve social, environmental, and economic equity, some of which have become books about how to alter the way we think about the design process. But in extreme circumstances, in crises, architects offer no coherent response. They play no sustained role in shaping policy and have had little active presence or voice in leading best practices in disaster prevention, mitigation, and recovery. There is still no career path that prepares students to work as *urgentistes*—design professionals who intervene at a crucial moment in the recovery process to produce enduring solutions.

Which is precisely why this book is about the architects who are helping save lives. Innovative, fascinating work is being done by small teams of outstanding professionals in Asia, Latin America, Africa, and the United States, who are proving to be critical, relevant partners helping communities recover from

disaster and rebuild. The highly skilled architects and leaders in other fields who have so generously contributed to this book are providing resilient solutions that ensure the safety of new homes and bring coherence to land-use planning. These teams assess damage but also research innovative building technologies. They are at the forefront of the use of low-cost, energy-saving, environmentally sound materials and new methods of prefabrication. They have discovered ways to bring affordable high-tech solutions to vulnerable communities. These teams are experts in how best to bridge the gap that separates short-term emergency needs from long-term sustainable recovery. And they are experienced in helping reduce future risk, promote awareness, and protect relief investment. Admittedly, this level of expertise is rare, concentrated in the hands of far too few professionals working worldwide.

Beyond Shelter is a call to action. When I started writing this book and searched for practicing architects skilled at working with risk almost everyone asked me the same question: why architects? As if to say, what is it to us? At the conference Risques Majeurs 2008 (Major Risks 2008) sponsored by the European Union, two or three architects were present. The officials and ministers I spoke with reminded me that on average architects contribute to only 3 percent of the world's built environment. Their indifference—or worse, irrelevance—to the world's most vulnerable communities made them seem hardly worth talking about. Three percent is a terrible number.

But if not architects and planners, who is in charge of rebuilding towns and villages leveled by earthquakes and cyclones? The answer is disquieting: no one is in charge. Typically, a patchwork of nongovernmental charities, government agencies, and residents themselves cobble together solutions. In large-scale disasters, even when aid pours in, the expertise and planning infrastructure needed to make best use of the money are lacking.

Myriad organizations worldwide respond to catastrophic events, some providing emergency and transitional shelters, others building permanent homes for hundreds of thousands of displaced people. In the last ten years the major international NGOs (Oxfam, UN-Habitat, Care, Red Cross Societies, Caritas, and others) have taken on the responsibility of properly housing people after disasters. And their efforts have led to success stories. The International Federation of the Red Cross now offers oversight and assistance to less-experienced agencies, although only on a voluntary basis. There is still no coordinated response. No one is ultimately held responsible (beyond operations within individual agencies).

As a result thousands of smaller groups play a critical role in protecting the homeless, and these vary widely in scope, competence, approach, and effectiveness. Few among them specialize in building homes or infrastructure before disaster strikes, and rarely are they screened for expertise. Worse, many of these groups do not have the capacity to judge the quality of experts they employ. Ironically, the plethora of published guides and internationally accepted standards for good practice, intended to help professionalize the sector, can just as well empower individuals who do not have the operational or technical skills to work on the ground in reconstruction. Competing mandates and donor priorities, weak coordination, fragmented knowledge, and a blatant disregard for environmental health often characterize the failed practices that prevail after a disaster, and that lead to new dangers as well as intolerable waste. More than ever there is a crucial and immediate need for architects (along with other built-environment professionals) to bring their training, competence, and ingenuity to disaster-risk prevention, mitigation, response, and recovery.

Here are just three of the many ways in which architectural know-how is critical in post-crisis situations. The first has to do with capacity. Well-trained architects who are actively building

have wide-ranging experience. In addition to their ability to erect secure, durable structures, they are expert contract managers capable of calculating needs, resources, and budgets through the arc of a program. All of this helps save money and improve humanitarian action.

Representation is the second area: architects working in close collaboration with communities can help them act on their own behalf. Playing the roles of designer, historian, negotiator, and advocate, architects develop site alternatives that help secure land tenure, reblock overcrowded slums, afford better access to water, sanitation, air, and light, introduce public spaces, and improve the relationship with the local ecology. They can then represent community consensus on viable projects to intransigent or indifferent governments, and this, in turn, promotes local independence. It is terribly difficult for communities to successfully represent their own best interests in the face of intractable politics.

The third function is vision. Recovery extends well beyond the need for shelter. In a state of emergency it is difficult for desperate individuals to imagine a better future. Architectural expertise can promote public health, encourage investing in new skills and environmental awareness, and advocate for mitigating risk, which together help ensure a sustainable and safe way of life.

But for these qualities to take hold after crises, architects and planners must engage in a broader conversation, among the experts in humanitarian aid, anthropologists, conservation ecologists, bankers and economists, structural engineers, public-health officials, surveyors, and within the context of policy makers and communities. These groups also need to know whom to turn to and where to put their confidence. And practitioners—including architects—must guard against the tendency to fall into rote responses and convenient solutions. Industry-wide, good ideas and know-how succumb to habit and

the need for efficiency, which may stifle the opportunity for invention. Yet architects are not only skilled technicians; they are also creative artists, and those talents are needed in such circumstances. Fresh approaches that lessen the vulnerability of fragile populations and strengthen their resilience and potential will only come from the combined resources and experience of these groups working collaboratively. Simply put, we must start speaking with others.

Open and sustained debate is also needed to hold everyone involved accountable—to produce credible solutions and coherent strategies that address the myriad problems: spatial and environmental planning, the need for vernacular and appropriate housing, the overwhelming scale of today's disasters, preservation of cultural integrity, funding streams, and how best to function on the ground. There has been a tendency in the aid community to accept massive waste as a corollary of speed; they play down the abandoned projects, the systematic demolition of undamaged homes, poor land choices, and environmental degradation that routinely accompany the recovery process. Homes have failed before anyone had a chance to live in them, and some post-disaster settlements have led to serious physical and mental-health problems for their new residents. The absence of expertise is a trespass that leaves communities more vulnerable than before. The best intentions are rarely good enough, especially if they are not scrutinized in light of their outcomes.

Beyond Shelter is intended to help this diverse group of decision makers understand, value, and engage architects—as *partners*—in shaping principles that respond to the growing threat of disaster risk in urban and rural settings around the world. We cannot wait. To help re-create a decent quality of life at scale is an enormous challenge. To meet it we must reinvest architecture with the capacity to be a powerful, disruptive force, a source of discovery and change.

So this is also a book for students in the design fields—to inspire and stir a passion for reform. The urgent need to afford the next generation of architects new relevance has compelled a handful of professionals to change the way we think about architectural education. At Columbia and MIT, at schools in Portland, San Diego, New Orleans, Montreal, Paris, Caracas, São Paulo, and Santiago, and at new universities being established in Japan and India, students are working on projects that revolutionize social housing, tackle poverty, segregation, and violence in cities and rethink our response to risk. These innovative programs are providing alternatives to the traditional design studios that promote self-interest and flights of fantasy—though these qualities are not in themselves bad. Rather, when aspiring architects are confronted with the real world, when they test their mettle against social injustice, and especially when they are given the opportunity to work directly with communities in need, they draw upon honesty, life experience, and fear, which unleash fresh insights and lead to highly creative solutions.

All of this is in our best interests. We who live in wealthy nations are not immune from disasters, and we, too, struggle with our own disinvested communities, inequalities, and poverty. We have a lot to learn from our poorer neighbors about dealing with crisis at home. Learning from extreme conditions in the

developing world is a powerful source of creativity. Evolving risk requires new ways of thinking. For instance, the emerging use of microfinance and microinsurance, which helps increase resilience in poor communities, is bringing new business models to affluent markets at a time when the business climate is otherwise not favorable. Citizen-led reconstruction, an empowering and collaborative process that supports socially equitable development, is teaching us how to value and forge collaborations and synergistic partnerships rooted in local priorities. Streamlining costly, complex innovations has led to the development of such clever devices as portable ultrasound readers, LED lights, and point-of-origin water purifiers, as well as strategies for a low-carbon future and greater biodiversity. The strides being made to address poverty and scarcity are already improving our use of technology. Similar *trickle-up* approaches are being tested in education. Certainly, new ways of solving the ingrained problems that put us at risk will come from an array of cultures, economies, and geographies that share our desire for greater security.

What does it mean to be safe? Safety, I have learned, is not only anchored in better technologies or better buildings. Safety lies somewhere beyond shelter, in the freedom of being secure enough to relax, play, aspire, and dream for generations.

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A school in Pétienville, Haiti, after the earthquake of 2010. Nearly 5,000 schools were destroyed or severely damaged.



PART 6

IS PREVENTION POSSIBLE?



"One of the shared lessons from our experience in Vietnam and Myanmar is that principles of safe, storm-resistant construction can be quickly and easily transferred to new communities precisely because they can be adapted to any local construction technique."

MORE TO LOSE: THE PARADOX OF VULNERABILITY

JOHN NORTON AND GUILLAUME CHANTRY
DEVELOPMENT WORKSHOP FRANCE,
LAUZERTE, FRANCE

The cruel paradox of vulnerability among the poor is that as one invests more scarce resources in one's home the cost of recovery from damage caused by natural hazards also increases—there is more to lose and repairs cost more as well. This increasing vulnerability can be reduced if families and builders integrate a few key principles of hazard-resistant construction when they build. Poor communities worldwide face risk bluntly, exposed to repeated cycles of loss and recovery. They build on fragile, compromised sites along fault lines and slopes and in the paths of hurricanes and typhoons. Recovery from the effects of extreme weather and climate is getting more and more expensive and the need to recover more frequent. For many families this means backsliding further into poverty.

This situation overwhelmingly characterizes conditions in Thua Thien Hué province, central Vietnam, where Development Workshop France (DWF) has worked for more than twenty years to help prevent typhoon and flood damage to people's homes and public buildings.¹ Our long-term, intimate involvement with some of the poorest communities on the planet has been rewarding insofar as we have been making headway in addressing this innate paradox. But extreme climatic events (storms, wind, floods, droughts) are now occurring with a frequency and force that make it impossible to predict whether our current approach will be relevant for more than a generation. We therefore place great emphasis on constant reassessment, adjustment, and review of our methods.

In rural central Vietnam poor families have virtually stopped building their houses out of locally gathered materials—bamboo, rice thatch, timber for poles. Today, they use rigid-walled structures of cast cement brick. They make their own wall blocks and roof tiles on-site, using cement and sand purchased from small local suppliers, or buy processed building materials at local markets. The shift to new materials and techniques is almost universal, as poor communities come to

associate new building practices with a better lifestyle. But this change in habit has never translated—in either material or economic terms—into safer homes or more stable futures. Buildings made in the modern mode do not withstand punishing winds and water well, and the cost of recovery when a home is damaged has gone from almost nothing to several hundred dollars for the average family. At the same time our experience demonstrates that risk can be avoided, especially in zones under constant threat—the hotspots for which we lack good practice.

Twenty-five years ago most poor rural families in central Vietnam lived in thatched pole-frame houses, which were easily destroyed by storms but quickly rebuilt with help from neighbors and family. In the mid-1980s a new economic policy in Vietnam changed this. Families, though still poor, began to have a little more disposable income, so they improved their homes, making them better and stronger—or so they thought. Nearly 100 percent of the rural housing stock in the region has been replaced in the past twenty years. Some 70 percent of these houses will be either heavily damaged or destroyed by the next major storm, and such storms now come every year.

Most Vietnamese houses are built a little at a time and are the result of years of savings, borrowing, and the owners' own labor. The cost of building an average 375-square-foot (35-sq.-m) house, if it were done at once (or what it would cost a family to replace a destroyed home), is about 25 percent of a family's extremely modest income.² A damaged home is therefore a considerable setback and can trigger a downward financial spiral. Families risk their health, their ability to send children to school, and even their capacity to earn a living in order to rebuild. Some families have rebuilt their homes four or five times in a decade—a terrible effort and strain. Many families never fully recover, but instead live at greater risk in homes that have been poorly repaired.

Development Workshop works closely on disaster-risk reduction with communities in Vietnam. Since 2000 we have aggressively promoted prevention—strengthening houses and public buildings so that they resist the impact of recurrent floods, typhoons, and whirlwinds. Reducing the risk of damage means that families can channel their scarce resources to more productive uses instead of diverting them to repairs over and over again. It can be difficult to convince people with little means that they should spend more on a safer future. Sadly, the ultimate argument is made when a devastating cyclone passes and only the strengthened houses are left standing—a lesson lost neither on the local people nor the authorities.

At the same time, while donor and development institutions eagerly embrace disaster prevention, risk reduction, and mitigation and debate best methods, it is difficult to measure the impact and value of prevention. How does one quantify the value of preventing death and destruction? What priority should be allocated to prevention? It is easier to obtain funds to rebuild one house after a disaster than to strengthen many beforehand at the same cost.

This does not mean that reconstruction guarantees safer building—far from it. When tremendous resources are mobilized fast, quality control and best practices may be lacking and there is a terrible risk of rebuilding vulnerability. Yet it is during the recovery period that disaster-risk reduction practices should be integrated—at a time when people understand the necessity and the work can be done at low cost. It is far more costly to go back later to replace badly built “temporary” buildings (which typically remain in place for a long time) with better ones that do not repeat past hazardous building practices. That is not the best way to help communities build safely.

Our approach is pragmatic and specific: we deliberately promote generic principles of risk-resistant safe construction that are suited to the context of a region or individual building

6.1
MORE TO LOSE

ORGANIZATION
DEVELOPMENT WORKSHOP FRANCE

PROJECT LOCALE
THUA THIEN HUÉ, VIETNAM



(previous spread) In Vietnam, the house of Nha Tam Vuong dai Phu Da before it was reinforced

↑ The house of Nha Gia Co Tho, after it was reinforced using DWF guidelines and raised above flood level

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and can be adapted to each family's needs. No two houses or public buildings have the same weaknesses, so applying principles rather than a specific technology is key. Moreover, generic principles can be applied to both existing and new structures. This is not to say that Vietnamese building regulations play no part, but rather that in the predominantly semiformal construction sector legislation is not the best route to reach the poor and help them make their homes safer.

Our program in central Vietnam promotes Ten Key Points of typhoon-resistant construction. These principles highlight specific technical safety measures: diagonal bracing, good connections among all components of a building, the best shape and angle of pitch for the roof, separation of high-risk veranda roofs from the main roof, and firm anchoring of the roof covering (such as tiles or corrugated-metal roofing sheets). In addition, they point to basic rules of safe location, good building shape, the value of doors and windows that close securely, the importance of placing matched openings (doors and windows) in opposing external walls so that wind can blow through the building and not build up internal pressure, and the benefits of planting trees as windbreaks.³

These simple concepts can be interpreted or adapted according to the nature of a building and its construction materials. For example, a roof made of corrugated-iron sheeting can be held down with supplementary metal retaining strips that run along the length of the roof, and in the case of tiled roofs, these should be anchored with thin vertical reinforced-concrete ribs. Ironically, these ribs were a traditional Vietnamese technique that has long been abandoned. We have helped families strengthen more than 2,000 houses in central Vietnam; the average cost of preventive strengthening is 15 to 30 percent of the building's reconstruction cost.

While preventive strengthening of homes in high-risk areas may seem an obvious good idea, the concept was not embraced

immediately. In 1998 our proposal to reinforce homes of the poor in Thua Thien Hué was greeted with derision by provincial authorities. Fortunately, we had already demonstrated the advantages of safe construction techniques in a small pilot program in the province and had long-term partners there.⁴ Our long-term relationship with local partners, including people in the provincial and communal local authority structure, proved to be a major strength. In some cases individuals who had worked with DWF in 1989–90 had risen through the ranks of local government and the official Communist Party system and were able to provide staunch support for our work.

In addition we work with an almost exclusively Vietnamese team and have very little staff turnover. Indeed, many of our key staff in Vietnam have worked on DWF projects for more than ten years. This longevity affords us collective institutional memory and a depth of local knowledge that is precious and relatively unusual among foreign NGOs. Ten years after our initial proposal we now have wide provincial backing. Families and authorities have seen for themselves that using our Ten Key Points is an efficient and cost-effective means to resist the impact of typhoons and floods. Seeing is believing.

DEVELOPING A CULTURE AND PRACTICE OF PREVENTION

The process of preventive safety practiced at DWF is broadly based and involves many different local actors and actions. At its heart is a straightforward message: Prevent Storm Damage. We form partnerships with local governments and the families whose houses will be improved. To start with, we train advisors from area villages, or communes, to draw up a list of the work that needs to be done for each house. Then we tell the family how much it is going to cost. The family decides whether it can



← Ten Key Points of Cyclone Resistant Construction: this poster, in Vietnamese, Thai, Myanma Bhasa (Burmese), English, and other languages, represents DWF's core principles of good construction. It is a simple, inexpensive tool, easily distributed.

↑ The original poster was drawn by a local artist in 1989. The ten points were not only displayed but sung.

We offer training sessions in which nearly all the builders in a commune learn about safer construction alongside community leaders. This is the first formal training many builders have had.

afford the work and whether to go ahead. In the first years of the program we provided a subsidy to cover some of the costs, but families have always contributed cash and labor. The average cost of strengthening a rural home is roughly \$250. If a family cannot undertake the work itself, the project will ask the People's Committee, officials of the provincial government, to help by assisting in organizing and supervising the work. However, most families do the work themselves. More than 30 percent of the households we have assisted are headed by widows and economic widows who have lost a husband either to the sea or to a city in search of work.

We later discovered a drawback in our process. Follow-up interviews revealed that families were placing so much value on strengthening their homes that they were willing to borrow money from moneylenders and relatives at ridiculously high rates of interest. This sort of borrowing causes problems down the road. So we started a pilot program with our partner communes in 2002, using project funds (and later grants) to provide low-interest loans for house strengthening; it ran for two years. We wanted to demonstrate that people were willing

to borrow for a purpose that would not generate income, such as prevention, precisely because it would save them money later on. We also wanted to prove that very poor clients would and could pay back their loans. In 2008 we negotiated with the Vietnam Bank for Social Policy to launch a new, low-interest, no-collateral credit product that specifically targets house strengthening with repayment over five years. Because of its success the DWF subsidy has largely been superseded. The loan program, which relies on existing lending records and borrower repayment capacity assessments and works with each commune's People's Committee and the Farmers' and Women's Unions, is critical to making preventive strengthening sustainable and replicable.

The People's Committee is the local authority in each commune and an important partner. With it we develop a damage-prevention committee in each district, charged with coordinating our efforts. This is where we address the idea of prevention for the first time in a village or town. While preparedness has long been a Vietnamese strength, the prevention of damage at the local level has not. The communes each prepare

a five-year damage-prevention action plan that covers a wide range of kinds of work needed. DWF provides support at this stage by helping the communes identify priorities. For example, we build bridges, construct safe harbors for families living on boats, and ensure safe access and escape routes. The committee also identifies the neediest families. Families are selected democratically, by a vote organized at the hamlet level.

These activities are directed and guided by some twenty local DWF staff based in Hué city, divided roughly into one team tasked to raise awareness and one with technical skills. We have put wireless radio communication systems in place and integrated storm-resistant construction techniques into the government-sponsored temporary house-replacement program.

Building on this experience, DWF has encouraged the communes' disaster-prevention committees to work as a network, sharing their knowledge, successes, and failures with communes in neighboring provinces that would like to join our program. During a typical 15-month program we work closely with some 12 communes, selecting approximately 550 families (or 2,750 people) to receive direct help and training; 250 builders and

village cadres (commune and hamlet leaders) participate, as well as eighty primary-school teachers, who in turn reach 1,200 children. At the district level we train eighty construction technicians. Overall, 100,000 people are exposed through vigorous public-information campaigns to our Prevent Storm Damage message.

This wall-to-wall approach is the key to generating a common understanding of prevention among local builders and hamlet leaders. We offer one-and-a-half-day training sessions in which nearly all the builders in a commune learn about safer construction alongside community leaders. This is the first formal training many builders have had. They learn why storms damage buildings and how to build for the future.

In order to emphasize the long-term value and savings of preventive strengthening, DWF members actively participate in the process, ensuring quality control. Where possible we work on buildings that will be seen and used by many, in order to further our educational mission. We have reinforced schools, cultural centers, markets, and other public facilities. We have also built kindergartens because they are similar in size to



←← A DWF staffer trains builders.
← Bamboo huts are erected on school grounds to demonstrate that safe building techniques can be applied at home as well. Here, an example in Myanmar
→ A full-size mock-up of a strengthened roof is transported throughout neighboring communes to show safe construction techniques.
→→ Opening ceremony for a new strengthened kindergarten facility in Myanmar



→ Child's painting of a house blowing away during a storm

→→ *The Mountain King against the Storm Genie*, a folktale reenacted by schoolchildren

↓ Boat races are part of raising awareness

↓↓ A Cham and Man spectacle adapted to promote typhoon-disaster prevention

↘ A risk-reduction slogan on a chin strap



Vietnam typically suffers some six typhoons a year, but in 2009 there were ten before the season was over.

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homes and thus offer a good way to expose parents to safe construction techniques. These new, safe public buildings can also serve as a refuge in times of disaster.

Our work in schools goes beyond making buildings safer. DWF works with teachers and children to integrate the issues of prevention into school curricula and involve children in risk reduction. School activities include drawing and poetry competitions on the theme of storm-resistant building. Children are a big help because they share these ideas with their parents—and of course, they are the house-builders and home owners of the future. Every year primary-school children perform in a play about the need to take action. The plays are videotaped so that we can reach a larger audience. One is *The Lazy Builder*, about a husband who is more interested in drink than safety, despite the exhortations of his wife and daughter, and whose home is destroyed by a typhoon. And in the traditional tale *The Mountain King against the Storm Genie*, the mountain king triumphs over the threat of typhoons.

The important role of children in communicating our message is part of the bigger, sustained Prevent Storm Damage campaign, which aims to inform and motivate the public. Repeated and regular participatory activities, designed to raise awareness, take our prevention message directly to the community. Here we use any and all opportunities to attract attention and gather a crowd—from loudspeakers to wireless FM transmission. We make audiotapes about prevention. We use television, posters, the press, and cartoon strips. We even organize activities that bring the communes together: boat races, soccer matches, rock concerts, and puppet shows all get the message across. Puppets shows in particular have great appeal, as traditional puppetry in Vietnam has always been used to convey social messages.

Vietnam typically suffers some six typhoons a year, but in 2009 there were ten before the season was over. Ketsana, on

September 26, destroyed 17,000 houses and 772 square miles (2,000 sq. km) of cropland across ten provinces. Warmer oceans have made storms more fierce worldwide. As the typhoons become more frequent and ferocious, the country is at increasing risk from rising sea levels, which threaten 40 percent of its land mass. As concern increases about the known and unknown impact of climate change on coastal Vietnam, a growing public is ready to listen to messages that help them address the risks of adverse weather.

The Development Workshop project is above all community-based. Its success is predicated on enabling communities at the local level to take measures to reduce their own vulnerability. In 2006, when houses and public buildings strengthened by our methods performed extremely well during the deadly Typhoon Xangsane, families were inspired to copy and apply the Ten Key Points of safe building practice. Thua Thien Hué province then issued an edict exhorting local authorities, provincial services, and the general population to adopt our principles. The government built demonstration houses in three different geographical contexts and produced its own handbook. Support at the provincial level has made it possible for us to train local architects and engineers. Our strategy is intended to complement Vietnam's very good, longstanding, broad national approach to controlling floods by building dikes. Thus, we also collaborate with the Provincial Committee for Flood and Storm Control. An important result of this collaboration has been the first interactive disaster website in Vietnam.⁵ Information is posted in real time: communes have access to official data on storms and disasters as they happen and can contribute local information as well. Where the local authorities are supportive and are working with the population to reduce vulnerability on several local fronts, communication campaigns are raising awareness, while financial and administrative structures back the process.

EXPORTING THE TEN KEY POINTS

In Vietnam the work we have done to prevent and limit destruction has stood up well. In nearby Quang Nam province during Typhoon Ketsana the buildings strengthened using our system served as refuges for the most fragile communities. Recent typhoons are the best test. After one such storm two similar buildings stood side by side: one, with its distinctive DWF bars on the roof, tying down the covering, remained intact; the other was a roofless shell, virtually blown away. People have taken notice. Now, after more than two decades of incremental work, careful coordination with the existing political structure, and development of a reputation for probity, our program is expanding into new provinces. Make no mistake: this is in large part because the concept is simple and easy to export.

In spite of our successes our work in Thua Thien Hué province is not enough, on its own, to redress the degree of vulnerability people face in central Vietnam. We are a good model of what can be achieved, and we have managed to influence decision makers; we have even been recognized internationally.⁶ But so much more has to be done. Exporting safe principles (and the myriad ways to reinforce them) to other provinces and regions is critical if we are to have an impact in Southeast Asia, where the cycle of weather-related destruction is accelerating.

In May 2008 Cyclone Nargis hit the delta region of southern Myanmar; 800,000 houses were destroyed, along with 4,000 schools and public buildings. The NGO Save the Children, well-established there since 1995, was familiar with our work in Vietnam and invited a team, including Vietnamese staff, to come and see how we might adapt our process to local conditions. Together we developed the Safer School program, based on our Ten Key Points, and produced a version of the posters in Myanma Bhasa, the official and primary language of

Myanmar. Some details were revised—for example, to address local pole-and-bamboo construction techniques. In the ensuing project several hundred schools, as well as early child-development centers and new homes, were strengthened to resist the impact of storms and cyclones.

The program was systematic: first, engineers from Myanmar trained in our office in Thua Thien Hué; they then identified target villages, assessed buildings, ordered materials, and trained local builders and residents. As in Vietnam, the first task was to retrofit the most fragile buildings—in this case schools. To date, work has been carried out entirely in schools hurriedly rebuilt after Nargis, not one of which included a single feature that would resist a future cyclone. In addition we built a small bamboo-frame house, about 10 by 10 feet (3 by 3 m), on a school playground to make it clear to parents that the Ten Key Points can be applied to any rural home. Some of our schools have already stood up to fierce whirlwinds, convincing residents that, indeed, they are safer. Families also unanimously consider our model of a reinforced-bamboo house an extremely good example of how to make their own homes storm-resistant. People have quickly grasped the principles of safe construction. We held dozens of one-day workshops in the villages, and although some people said they had already known something about safe building practices, this was the first time that they received information in a systematic manner. Many beneficiaries learned the key points by heart.

One of the shared lessons from our experience in Vietnam and Myanmar is that principles of safe, storm-resistant construction can be quickly and easily transferred to new communities precisely because they can be adapted to any local construction technique. To our way of thinking it is critical to work with a relevant set of principles that are easy to assimilate, adaptable to any local context, and effective. Preventive strengthening is not free, and families are put off by this, but prevention is much

cheaper than repeatedly rebuilding one's damaged or destroyed house, and much safer than risking one's life.

Today, in the wake of an exceptionally lethal earthquake in Haiti, the UN is calling for long-term measures to rebuild the island more safely. "Hopefully," declared an official, "no new hospital, school, or public structure will be built without integrating disaster risk reduction principles into its design and construction. Disaster-risk reduction is the best investment that nations and communities can make to reduce future disaster impacts and protect their people and assets."⁷ Only time will tell whether her hope will be realized. Extreme poverty still limits the opportunity for poor families to make their homes safer or, indeed, their lives better. In the meantime Development Workshop will continue to demonstrate through practical action that the very poor can and, with minimal help, *will* step forward to protect themselves.

Notes

1 Development Workshop France is a French nonprofit organization, one of a group of NGOs originally founded as Development Workshop (DW) in London, UK, in 1973. Our first projects in Vietnam began in 1989; the current program promoting disaster-resistant construction methods began at the end of 1999 and continues today.

2 Costs are difficult to quantify in western terms, but a typical Vietnamese family might earn \$50 a month (a single individual \$12), and the cost of a new house might be in the range of \$2,000—an astronomical sum.

3 These points were developed and tested by DWF in 1989–91 in consortium with the Groupe d'Echange et de Recherche Technologiques (GRET) of the United Nations Development Programme/United Nations Centre for Human Settlements (UN-Habitat), program VIE/85/019, "Demonstration of Typhoon Resistant Building Techniques." DWF's current program is supported by the European Commission on Humanitarian Aid, the Canadian International Development Agency (CIDA), the Ford Foundation, and local contributions.

4 In projects in 1989–92 DW had incorporated typhoon-resistant construction details in public buildings in what later became Thua Thien Hué province and in other provinces farther north (Quang Binh, Quang Tri, and Thanh Hoa).

5 <http://www.ccfsc.gov.vn/KW367A21/Home-page.aspx>.

6 DWF received the World Habitat Award in 2008 and the Sasakawa Award Certificate of Distinction from the United Nations International Strategy for Disaster Reduction organization (UNISDR) in 2009.

7 Margareta Wahlström, Special Representative of the UN Secretary General for Disaster Risk Reduction, quoted in a press release, United Nations International Strategy for Disaster Reduction Secretariat (UNISDR), January 22, 2010, posted at www.unisdr.org/news/v.php?id=12398, accessed August 18, 2010.